What is claimed:

1. A high-efficiency, small-scale, combined heat and power, concentrating solar energy system comprising:

at least one collector, which comprises:

a concentrator, having an aperture of between about 0.5 m about 2 meters, adapted for focusing incident solar radiation to a focal point;

at least one drive on which said concentrator is mounted, said drive being adapted for tracking a direction that will maximize the solar incident flux, at least along one axis;

a control unit, in communication with said drive, for controlling said drive, based on an expression of said direction, as functions of time of day, season, and geographic latitude; and

a power conversion unit, substantially at said focal point;

a power supply system, which receives electrical power from said power conversion unit;

a heat supply system, which receives heat from a cooling system of said power conversion unit,

wherein a combined heat and power efficiency of said high-efficiency, small-scale, combined heat and power, concentrating solar energy system is greater than 60% overall efficiency.

2. The high-efficiency, small-scale, combined heat and power, concentrating solar energy system of claim 1, wherein a combined heat and power efficiency of said high-efficiency, small-scale, combined heat and power, concentrating solar energy system is greater than 65% overall efficiency.

3. The high-efficiency, small-scale, combined heat and power, concentrating solar energy system of claim 1, wherein a combined heat and power efficiency of said high-efficiency, small-scale, combined heat and power, concentrating solar energy system is greater than 70% overall efficiency.

4. The high-efficiency, small-scale, combined heat and power, concentrating solar energy system of claim 1, wherein a combined heat and power efficiency of said high-efficiency, small-scale, combined heat and power, concentrating solar energy system is greater than 75% overall efficiency.

5. The high-efficiency, small-scale, combined heat and power, concentrating solar energy system of claim 1, wherein said at least one collector comprises a plurality of collectors, arranged as a cluster, each including said heat supply system, and further wherein said heat supply systems from each collector are arranged in parallel, so as to have the same inlet and outlet coolant conditions.

6. The high-efficiency, small-scale, combined heat and power, concentrating solar energy system of claim 1, wherein said heat supply system operates an air conditioning system.

7. The high-efficiency, small-scale, combined heat and power, concentrating solar energy system of claim 1, wherein said collector includes a closed loop system.

8. The high-efficiency, small-scale, combined heat and power, concentrating solar energy system of claim 1, wherein said at least one drive includes at least two drives, adapted for tracking a direction that will maximize the solar incident flux, at least along two axes.

9. The high-efficiency, small-scale, combined heat and power, concentrating solar energy system of claim 1, wherein said at least one drive is a radio dial drive.

10. A celestial tracking system, comprising:

a first main support;

a first tracking unit, mounted on said first main support, which comprises:

a first radio-dial drive for celestial tracking mechanism, comprising:

a first support structure;

a first cylindrical drum, mounted on said support structure, said drum defining a drum axis of rotation and a drum external surface, along its circumference, and said drum having:

a first central shaft, parallel to said drum axis of rotation, and fixedly attached to said drum, so as to rotate with said drum, in said axis of rotation;

a first spring, mounted on said drum external surface, having a spring axis orthogonal to said drum axis of rotation; and

a first anchor, mounted on said drum external surface;

a first cylindrical capstan, mounted on said support structure, adjacent to said drum, and defining a capstan axis of rotation, parallel to said drum axis of rotation and a capstan external surface, along its circumference;

a first cable, having first and second ends, said cable being tightly wound around said drum in a first direction, and around said capstan in a second direction, wherein said first end is fixedly attached to said anchor and said second end is fixedly attached to said spring, and wherein said spring is held in tension with a force which is greater than the required force for turning said drum, so that turning the capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift; and

a first motor, mounted on said main support, for providing a tracking motion.

11. The celestial tracking system of claim 10, wherein said first motor is selected from the group of a step motor and a DC motor.

12. The celestial tracking system of claim 10, and further including a timing belt arranged between said first motor and said first cylindrical capstan.

13. The celestial tracking system of claim 10, wherein said first tracking unit is arranged on a first axis of rotation, and further including a second tracking unit, arranged on a second axis of rotation, and comprising:

a second radio-dial drive for celestial tracking mechanism, comprising:

a second support structure;

a second cylindrical drum, mounted on said second support structure, said second drum defining a second drum axis of rotation and a second drum external surface, along its circumference, and said second drum having:

a second central shaft, parallel to said second drum axis of rotation, and fixedly attached to said second drum, so as to rotate with said second drum, in said second axis of rotation;

a second spring, mounted on said second drum external surface, having a second spring axis, orthogonal to said second drum axis of rotation; and

a second anchor, mounted on said second drum external surface;

a second cylindrical capstan, mounted on said second support structure, adjacent to said second drum, and defining a second capstan axis of rotation, parallel to said second drum axis of rotation and a second capstan external surface, along its circumference;

a second cable, having first and second ends, said second cable being tightly wound around said second drum in a first direction, and around said capstan in a second direction, wherein said first end is fixedly attached to said second anchor and said second end is fixedly attached to said second spring, and wherein said second spring is held in tension with a force which is greater than the required force for turning said second drum, so that turning said second capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift; and

a second motor, mounted on said second main support, for providing a second tracking motion.

14. The celestial tracking system of claim 13, wherein said second motor is selected from the group of a step motor and a DC motor.

15. The celestial tracking system of claim 13, and further including a timing belt arranged between said second motor and said second cylindrical capstan.

16. The celestial tracking system of claim 13, wherein said first and second tracking units are arranged as an azimuth-elevation mount.

17. The celestial tracking system of claim 13, wherein said first and second tracking units are arranged as a cross mount.

18. The celestial tracking system of claim 13, wherein said first and second tracking units are arranged as a polar mount.

19. The celestial tracking system of claim 10, and further including a concentrating solar energy system, comprising:

a collector; and

a power conversion unit.

20. The celestial tracking system of claim 19, wherein said collector has a real focal point and an aperture of between about 0.5 meter and about 2 meters.

21. The celestial tracking system of claim 19, wherein said power conversion unit is selected from the group consisting of a thermal generator, concentrated photovoltaic cells, and flat photovoltaic cells.

22. The celestial tracking system of claim 19, arranged as a Combined Heat and Power (CHP) system.

23. The celestial tracking system of claim 19, and further including differential means for measuring the solar incident flux, for providing a closed-loop control of said tracking motion.

24. The celestial tracking system of claim 10, and further including a control unit, in communication with said motor, for controlling said tracking motion, using an expression for the direction that will maximize the solar incident flux.

25. A solar energy system, comprising:

a first main support of said solar energy system;

a first tracking unit, mounted on said first main support, which comprises:

a first radio-dial drive for celestial tracking mechanism, comprising:

a first support structure;

a first cylindrical drum, mounted on said support structure, said drum defining a drum axis of rotation and a drum external surface, along its circumference, and said drum having:

a first central shaft, parallel to said drum axis of rotation, and fixedly attached to said drum, so as to rotate with said drum, in said axis of rotation;

a first spring, mounted on said drum external surface, having a spring axis orthogonal to said drum axis of rotation; and

a first anchor, mounted on said drum external surface;

a first cylindrical capstan, mounted on said support structure, adjacent to said drum, and defining a capstan axis of rotation, parallel to said drum axis of rotation and a capstan external surface, along its circumference;

a first cable, having first and second ends, said cable being tightly wound around said drum in a first direction, and around said capstan in a second direction, wherein said first end is fixedly attached to said anchor and said second end is fixedly attached to said spring, and wherein said spring is held in tension with a force which is greater than the required force for turning said drum, so that turning the capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift;

a first motor, mounted on said main support, for providing a tracking motion;

a collector; and

a power conversion unit.

26. The solar energy system of claim 25, wherein said first motor is selected from the group of a step motor and a DC motor.

27. The solar energy system of claim 25, wherein said first tracking unit is arranged on a first axis of rotation, and further including a second tracking unit, arranged on a second axis of rotation, and comprising:

a second radio-dial drive for celestial tracking mechanism, comprising:

a second support structure;

a second cylindrical drum, mounted on said second support structure, said second drum defining a second drum axis of rotation and a second drum external surface, along its circumference, and said second drum having:

a second central shaft, parallel to said second drum axis of rotation, and fixedly attached to said second drum, so as to rotate with said second drum, in said second axis of rotation;

a second spring, mounted on said second drum external surface, having a second spring axis, orthogonal to said second drum axis of rotation; and

a second anchor, mounted on said second drum external surface;

a second cylindrical capstan, mounted on said second support structure, adjacent to said second drum, and defining a second capstan axis of rotation, parallel to said second drum axis of rotation and a second capstan external surface, along its circumference;

a second cable, having first and second ends, said second cable being tightly wound around said second drum in a first direction, and around said capstan in a second direction, wherein said first end is fixedly attached to said second anchor and said second end is fixedly attached to said second spring, and

wherein said second spring is held in tension with a force which is greater than the required force for turning said second drum, so that turning said second capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift; and

a second motor, mounted on said second main support, for providing a second tracking motion.

28. The solar energy system of claim 27, wherein said second motor is selected from the group of a step motor and a DC motor.

29. The solar energy system of claim 27, wherein said first and second tracking units are arranged as an azimuth-elevation mount.

30. The solar energy system of claim 27, wherein said first and second tracking units are arranged as a cross mount.

31. The solar energy system of claim 27, wherein said first and second tracking units are arranged as a polar mount.

32. The solar energy system of claim 25, wherein said collector has a real focal point and an aperture of between about 0.5 meter and about 2 meters.

33. The solar energy system of claim 25, wherein said power conversion unit is selected from the group consisting of a thermal generator, concentrated photovoltaic cells.

34. The solar energy system of claim 25, arranged as a Combined Heat and Power (CHP) system.

35. The solar energy system of claim 25, and further including differential means for measuring the solar incident flux, for providing a closed-loop control of said tracking motion.

36. The solar energy system of claim 25, and further including a control unit, in communication with said motor, for controlling said tracking motion, using an expression for the direction that will maximize the solar incident flux.

37. A central plant, comprising:

a plurality of units, each of said units including:

a first main support;

a first tracking unit, mounted on said first main support, which comprises:

a first radio-dial drive for celestial tracking mechanism, comprising:

a first support structure;

a first cylindrical drum, mounted on said support structure, said drum defining a drum axis of rotation and a drum external surface, along its circumference, and said drum having:

a first central shaft, parallel to said drum axis of rotation, and fixedly attached to said drum, so as to rotate with said drum, in said axis of rotation;

a first spring, mounted on said drum external surface, having a spring axis orthogonal to said drum axis of rotation; and

a first anchor, mounted on said drum external surface;

a first cylindrical capstan, mounted on said support structure, adjacent to said drum, and defining a capstan axis of rotation, parallel to said drum axis of rotation and a capstan external surface, along its circumference;

a first cable, having first and second ends, said cable being tightly wound around said drum in a first direction, and around said capstan in a second direction, wherein said first end is fixedly attached to said anchor and said second end is fixedly attached to said spring, and wherein said spring is held in tension with a force which is greater than the required force for turning said drum, so that turning the capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift;

a first motor, mounted on said main support, for providing a tracking motion;

a first transmission system, in communication both with said motor and with said cylindrical capstan, for transmitting said tracking motion from said motor to said capstan;

a collector; and

a power conversion unit.

38. The central plant of claim 37, wherein said first motor is selected from the group of a step motor and a DC motor.

39. The central plant of claim 37, wherein said first tracking unit is arranged on a first axis of rotation, and further including a second tracking unit, arranged on a second axis of rotation, and comprising:

a second radio-dial drive for celestial tracking mechanism, comprising:

a second support structure;

a second cylindrical drum, mounted on said second support structure, said second drum defining a second drum axis of rotation and a second drum external surface, along its circumference, and said second drum having:

a second central shaft, parallel to said second drum axis of rotation, and fixedly attached to said second drum, so as to rotate with said second drum, in said second axis of rotation;

a second spring, mounted on said second drum external surface, having a second spring axis, orthogonal to said second drum axis of rotation; and

a second anchor, mounted on said second drum external surface;

a second cylindrical capstan, mounted on said second support structure, adjacent to said second drum, and defining a second capstan axis of rotation, parallel to said second drum axis of rotation and a second capstan external surface, along its circumference;

a second cable, having first and second ends, said second cable being tightly wound around said second drum in a first direction, and around said capstan in a second direction, wherein said first end is fixedly attached to said second anchor and said second end is fixedly attached to said second spring, and wherein said second spring is held in tension with a force which is greater than the required force for turning said second drum, so that turning said second capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift;

a second motor, mounted on said second main support, for providing a second tracking motion; and

a second transmission system, in communication both with said second motor and with said second cylindrical capstan, for transmitting said second tracking motion from said second motor to said second capstan.

40. The central plant of claim 39, wherein said second motor is selected from the group of a step motor and a DC motor.

41. The central plant of claim 39, wherein said first and second tracking units are arranged as an azimuth-elevation mount.

42. The central plant of claim 39, wherein said first and second tracking units are arranged as a cross mount.

43. The central plant of claim 39, wherein said first and second tracking units are arranged as a polar mount.

44. The central plant of claim 37, wherein said collector has a real focal point and an aperture of between about 0.5 meter and about 2 meters.

45. The central plant of claim 37, wherein said power conversion unit is selected from the group consisting of a thermal generator, concentrated photovoltaic cells, and flat photovoltaic cells.

46. The central plant of claim 37, arranged as a Combined Heat and Power (CHP) system.

47. The central plant of claim 37, and further including differential means for measuring the solar incident flux, for providing a closed-loop control of said tracking motion.

48. The central plant of claim 37, and further including a control unit, in communication with said motor, for controlling said tracking motion, using an expression for the direction that will maximize the solar incident flux.

49. A heliostat, comprising:

a first main support for said heliostat;

a first tracking unit, mounted on said first main support, which comprises:

a first radio-dial drive for celestial tracking mechanism, comprising:

a first support structure;

a first cylindrical drum, mounted on said support structure, said drum defining a drum axis of rotation and a drum external surface, along its circumference, and said drum having:

a first central shaft, parallel to said drum axis of rotation, and fixedly attached to said drum, so as to rotate with said drum, in said axis of rotation;

a first spring, mounted on said drum external surface, having a spring axis orthogonal to said drum axis of rotation; and

a first anchor, mounted on said drum external surface;

a first cylindrical capstan, mounted on said support structure, adjacent to said drum, and defining a capstan axis of rotation, parallel to said drum axis of rotation and a capstan external surface, along its circumference;

a first cable, having first and second ends, said cable being tightly wound around said drum in a first direction, and around said capstan in a

second direction, wherein said first end is fixedly attached to said anchor and said second end is fixedly attached to said spring, and wherein said spring is held in tension with a force which is greater than the required force for turning said drum, so that turning the capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift;

a first motor, mounted on said main support, for providing a tracking motion;

a first transmission system, in communication both with said motor and with said cylindrical capstan, for transmitting said tracking motion from said motor to said capstan; and

a collector.

50. The heliostat of claim 49, wherein said first motor is selected from the group of a step motor and a DC motor.

51. The heliostat of claim 49, wherein said first tracking unit is arranged on a first axis of rotation, and further including a second tracking unit, arranged on a second axis of rotation, and comprising:

a second radio-dial drive for celestial tracking mechanism, comprising:

a second support structure;

a second cylindrical drum, mounted on said second support structure, said second drum defining a second drum axis of rotation and a second drum external surface, along its circumference, and said second drum having:

a second central shaft, parallel to said second drum axis of rotation, and fixedly attached to said second drum, so as to rotate with said second drum, in said second axis of rotation;

a second spring, mounted on said second drum external surface, having a second spring axis, orthogonal to said second drum axis of rotation; and

a second anchor, mounted on said second drum external surface;

a second cylindrical capstan, mounted on said second support structure, adjacent to said second drum, and defining a second capstan axis of rotation, parallel to said second drum axis of rotation and a second capstan external surface, along its circumference;

a second cable, having first and second ends, said second cable being tightly wound around said second drum in a first direction, and around said capstan in a second direction, wherein said first end is fixedly attached to said second anchor and said second end is fixedly attached to said second spring, and wherein said second spring is held in tension with a force which is greater than the required force for turning said second drum, so that turning said second capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift;

a second motor, mounted on said second main support, for providing a second tracking motion; and

a second transmission system, in communication both with said second motor and with said second cylindrical capstan, for transmitting said second tracking motion from said second motor to said second capstan.

52. The heliostat of claim 51, wherein said second motor is selected from the group of a step motor and a DC motor.

53. The heliostat of claim 51, wherein said first and second tracking units are arranged as an azimuth-elevation mount.

54. The heliostat of claim 51, wherein said first and second tracking units are arranged as a cross mount.

55. The heliostat of claim 51, wherein said first and second tracking units are arranged as a polar mount.

56. The heliostat of claim 49, wherein said collector has a real focal point and an aperture of between about 0.5 meter and about 2 meters.

57. The heliostat of claim 49, and further including a control unit, in communication with said motor, for controlling said tracking motion, using an expression for the direction that will maximize the solar incident flux.

58. A central plant, comprising:

a plurality of heliostats, each of said heliostats including:

a first main support;

a first tracking unit, mounted on said first main support, which comprises:

a first radio-dial drive for celestial tracking mechanism, comprising:

a first support structure;

a first cylindrical drum, mounted on said support structure, said drum defining a drum axis of rotation and a drum external surface, along its circumference, and said drum having:

a first central shaft, parallel to said drum axis of rotation, and fixedly attached to said drum, so as to rotate with said drum, in said axis of rotation;

a first spring, mounted on said drum external surface, having a spring axis orthogonal to said drum axis of rotation; and

a first anchor, mounted on said drum external surface;

a first cylindrical capstan, mounted on said support structure, adjacent to said drum, and defining a capstan axis of rotation, parallel to said drum axis of rotation and a capstan external surface, along its circumference;

a first cable, having first and second ends, said cable being tightly wound around said drum in a first direction, and around said capstan in a second direction, wherein said first end is fixedly attached to said anchor and said second end is fixedly attached to said spring, and wherein said spring is held in tension with a force which is greater than the required force for turning said drum, so that turning the capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift;

a first motor, mounted on said main support, for providing a tracking motion;

a first transmission system, in communication both with said motor and with said cylindrical capstan, for transmitting said tracking motion from said motor to said capstan;

a collector,

said central plant further including a power conversion unit.

59. The central plant of claim 58, wherein said first motor is selected from the group of a step motor and a DC motor.

60. The central plant of claim 58, wherein said first tracking unit is arranged on a first axis of rotation, and further including a second tracking unit, arranged on a second axis of rotation, and comprising:

a second radio-dial drive for celestial tracking mechanism, comprising:

a second support structure;

a second cylindrical drum, mounted on said second support structure, said second drum defining a second drum axis of rotation and a second drum external surface, along its circumference, and said second drum having:

a second central shaft, parallel to said second drum axis of rotation, and fixedly attached to said second drum, so as to rotate with said second drum, in said second axis of rotation;

a second spring, mounted on said second drum external surface, having a second spring axis, orthogonal to said second drum axis of rotation; and

a second anchor, mounted on said second drum external surface;

a second cylindrical capstan, mounted on said second support structure, adjacent to said second drum, and defining a second capstan axis of rotation, parallel to said second drum axis of rotation and a second capstan external surface, along its circumference;

a second cable, having first and second ends, said second cable being tightly wound around said second drum in a first direction, and around said capstan in a second direction, wherein said first end is fixedly attached to said second anchor and said second end is fixedly attached to said second spring, and wherein said second spring is held in tension with a force which is greater than the required force for turning said second drum, so that turning said second capstan in a first direction will turn the drum in a second direction, with substantially zero backlash and substantially zero drift;

a second motor, mounted on said second main support, for providing a second tracking motion; and

a second transmission system, in communication both with said second motor and with said second cylindrical capstan, for transmitting said second tracking motion from said second motor to said second capstan.

61. The central plant of claim 60, wherein said second motor is selected from the group of a step motor and a DC motor.

62. The central plant of claim 60, wherein said first and second tracking units are arranged as an azimuth-elevation mount.

63. The central plant of claim 60, wherein said first and second tracking units are arranged as a cross mount.

64. The central plant of claim 60, wherein said first and second tracking units are arranged as a polar mount.

65. The central plant of claim 58, wherein said collector has a real focal point and an aperture of between about 0.5 meter and about 2 meters.

66. The central plant of claim 58, wherein said power conversion unit is selected from the group consisting of a thermal generator, concentrated photovoltaic cells, and flat photovoltaic cells.

67. The central plant of claim 58, arranged as a Combined Heat and Power (CHP) system.

68. The central plant of claim 58, and further including differential means for measuring the solar incident flux, for providing a closed-loop control of said tracking motion.

69. The central plant of claim 58, and further including a control unit, in communication with said motor, for controlling said tracking motion, using an expression for the direction that will maximize the solar incident flux.